M.Sc. (MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE)
M.Sc. (MACS)

00248   **Term-End Practical Examination**

December, 2016

MMT-008(P) : PROBABILITY AND STATISTICS

Time : $1\frac{1}{2}$ Hours   *Maximum Marks : 40*

Note : (i)   *There are two questions in this paper worth 30 marks.*

(ii) *Answer **both** of them.*

(iii) *Remaining 10 marks are for viva-voce.*

1. Let $\mathbf{X} \sim \mathrm{N}_4\,(\boldsymbol{\mu}, \boldsymbol{\Sigma})$, where

$$\boldsymbol{\mu} = \begin{bmatrix} 2 \\ 4 \\ 1 \\ -3 \end{bmatrix} \quad \text{and} \quad \boldsymbol{\Sigma} = \begin{bmatrix} 9 & 0 & 2 & 0 \\ 0 & 4 & 0 & 1 \\ 2 & 0 & 6 & 0 \\ 0 & 1 & 0 & 9 \end{bmatrix}.$$

Write a program in 'C' language to find

(a) Marginal distribution of $\begin{bmatrix} x_1 \\ x_3 \end{bmatrix}$

(b) Conditional distribution of $\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ given $\begin{bmatrix} x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 1\cdot2 \\ -2\cdot6 \end{bmatrix}$

(c) Correlation coefficient between x_1 and x_3.   *15*

2. Write a program in 'C' language to compute the Hotelling's T^2, for any $n \leq 10$. Extend the program to compute Hotelling's T^2 for the given data : *15*

$$H_0 : \mu' = [7, 11] \text{ and the data matrix } \mathbf{X} = \begin{bmatrix} 2 & 12 \\ 8 & 9 \\ 6 & 9 \\ 8 & 10 \end{bmatrix}.$$

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